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VOYAGE OF THE "DIXMUDE" OVER NORTHERN AFRICA.

By Lieut. Lemaire.

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TECHNICAL MEMORANDUM NO. 253.

VOYAGE OF THE "DIXMUDE" OVER NORTHERN AFRICA.*

By Lieut. Lemaire.

This subject, as you know, is the voyage of the "Dixmude" of September 25-30, 1923, during which it won the official duration record. It would have naturally devolved upon Lieutenant Plessis de Grenedan, commander of the Dixmude, to tell you of his exploit, but his duties keep him near his airship and, moreover, his modesty would prevent his telling the whole truth. Nothing prevents me, however, from declaring that the conquest of this record is his work. It is the fruit of his ability and perseverance. It is especially the fruit of his faith in the future of rigid airships. He was one of the first to believe in this future. He believed in it while a thousand difficulties detained the Dixmude in its hangar and (this faith, which raises mountains, raised the Dixmude), when skeptics had already placed it in the "heavier-than-air" category.

All Frenchmen must know the history of the Dixmude, a trophy of the war. Built by the Zeppelin Company for the German Navy, where it was given the name of "L-72," and turned over to France in 1920 in conformity with the treaty of Versailles. A French crew, under the orders of its present commander, took it from Maubeuge to Cuers-Pierrefeu. The hangar at this place, then

incomplete, was not able to receive it and it had to be deflated. Then it was necessary to replace its ballonets of goldbeater's skins and establish, for this purpose, an entirely new industry in France. There were many difficulties and long delays, but finally, at the end of the summer, the Dixmude was ready to take the air. It made three successful trial trips and found itself ready toward the end of September to attempt a long voyage. It was planned to test its endurance and the navigation conditions above the sands of Africa and, incidentally, to win a record. This program was executed, point by point, and it only remains for me to tell with what success.

Early in the morning of September 25, the Dixmude is led to the middle of the aviation field, the weather being magnificent. For practice and as customary in starting, it is held by a pyramid of wire cables. After remaining thus for an hour, it ascends, makes a wide circle above Toulon and sails toward the sea at an altitude of about 2000 feet, via the Spanish cape of San Antonio. The sky is clear and the air luminous. A gentle but constant wind blows from the west. The meteorological reports are favorable.

As soon as the land is lost to view, we try all the resources of scientific navigation. Gyroscopic sextants and drift-meters come into play. In the afternoon, the lofty peaks of the Balearic Islands are discerned on our left and it is found from them that the course we have been flying is correct. At dusk the Cape of San Antonio appears directly ahead. The Dixmude passes it on the

right. Night falls. The stars come out, as the Spanish beacons disappear in the distance. All eyes now turn toward the coast of Algiers. At 11:30, the Cape Falcon light is sighted, then disappears and we are finally above Mos-el-Rebir. At midnight Oran is beneath us. The spectacle is magnificent. A flood of moonlight envelops with the same charm both the troubled land and the peaceful sea. Oran scintillates with lights, but few people are abroad. A few lights are shining here and there in the surrounding villages. The airship haven of La Senia shows its hangars whitened by the moonlight. The Dixmude passes by and follows the coast in the direction of Algiers.

I decided to retire. The impressions of the first night on an airship can never be forgotten. In climbing from the car to the corridor in the keel of the airship, I cling without pleasure to the ladder traversing the dark and empty space, where the wind blows through my garments in the effort to tear me away. The long corridor is dark and I feel my way cautiously, for the walk is very narrow, the fabric under it too weak to support safely the weight of a man and the hand rail nothing but a piano wire. Thus I proceed for about a hundred yards to my couch, a canvas hammock. The engines, with their regular droning, sing a lullaby and I fall asleep with a feeling of security.

In the morning the Dixmude is over Algiers. The white city and the red country bask in the brilliant sunlight. Snow-capped mountains form the background of the landscape. The city is already awake. Ships are moving in the harbor. Street cars are run-

ning. The curious gather in crowds, with their faces turned skyward. Kasbah, crowded together, as it were, like a ball, remains indifferent. The Dixmude makes a few evolutions over the city and the harbor, takes photographs, is welcomed by several early-rising airplanes, flies over the location of the future airport at Maison Blanche, drops some mail on the Baraki aviation field, the head-quarters of the naval airships, and resumes its eastward course. It follows the coast, red and out by dunes, picturesque for the aeronaut, though inhospitable to the mariner, and soon discovers Bougie behind Cape Carbon. The weather is fine, but, at an altitude of about 4000 feet, the Dixmude soon passes above a sea of cumuli. The wind is feeble, but still contrary. The meteorological reports are reassuring.

At Philippeville, in order to get away from the clouds, the commander changes the course landward. We pass Fetzara, a long lagoon behind a wall of hills, where a flock of rose flamingos, frightened at the sight of such a large bird, scatter in all directions. We soon perceive Bone over which we fly at 2:30 P.M. We have hardly time to note that it merits its name of "Bone the Beautiful" before the Dixmude is again enveloped in a sea of clouds. These thicken and allow us only occasional glimpses of the coast, until we reach Bizerte just before nightfall. The Dixmude descends to about 1600 feet, but fails to get clear of the clouds, through the breaks in which we distinguish Ishkeul, the lake, the harbor and the Russian vessels sequestered in it, the city and the Karouba, where we are obliged to forego leaving any message. Above Tunis

we encounter only a few clouds, but the sky is dark and the city is manifest only by the number and brightness of its lights. When we arrive at Hammamet, the clouds have grown thicker. Through a rift we perceive that a strong wind is blowing from the northeast and is carrying the airship southward. Our view is then shut off by the fog. When this is rent again, we perceive something indefinite below us - sea, land, sand or mud? or all at the same time? A beacon appears. It is the park of Ras Tina. The Dixmude is above the Keskenah Islands and sailing toward Sfax. During the night it wanders between Sfax and Gabes, awaiting dawn before passing over the desert, which might hold surprises.

In the morning we get our bearings by radio from Cuers away from which the Dixmude has sailed for two days. It is now bearing toward the interior. The route is marked by the line of "chotts" or salt marshes, Fedjed, Djerid, etc. The weather continues fine and a light wind, now favorable, blows us toward the south. At about 5000 feet the view is clear and extensive. The staff of the Dixmude gathers in the car to enjoy a new spectacle and turn over the leaves of descriptive books, as an animated atlas unrolls beneath them. What a marvelous lesson in Geography! Lakes as far as we can see, but no water. They have the appearance of seas of soap. On looking closely, we distinguish a network of trails and on one of them a line of enormous and fantastic animals. These are the shadows of camels, disproportionately lengthened by

finally water. Crocodiles live in it, so say our books, as survivors of the quaternary age. Now, we are over the desert. A "sea of sand" is hardly a metaphor. The horizon is undefined and of a dark violet color, as is so often the case on the ocean.

Below us, as far as we can see, the dunes appear like frozen billows. No landmark appears on the yellow sand spotted here and there by the shadows of drifting clouds.

return, and finally reach the railway. It follows the "Oued R'ir" to Touggourt and Ouargla. An "oued" is a river (or arroyo), the same as a "chott" in a lake, without apparent water. The "Oued and the "ksars" seem to be connected by a dark scarf. The "ksars" wheels, with streets for spokes, a wall for the rim and an open place in the center for the hub. The small square dwellings have a forbidding aspect. Outside the encircling wall, there are palm sometimes radial, converging toward the center of the village. Other paths glisten in the sun. These are irrigation ditches bordered by artesian wells. Beyond these begins the desert, marked by scattered clumps of palms and patches of dry plants with very long roots, and then comes the naked desert.

At 10:30 A.M. the Dixmude is above Touggourt. The longest stage of the voyage is completed and we sample the champagne in

tered among the dunes. Their oblong shapes, all pointing north-To what conditions of existence man can adapt himself!

After Souf come the large date-producing oases. In order to obtain a better view, we descend from an altitude of 5500 feet to about 3000 feet. Here are groves of palm trees among the dunes; there the "ksars," the nomad tents, the caravans, an "oued," an oasis with water and native laundresses washing their linen. Twilight comes and the Dixmude advances more slowly, for the wind is contrary. At sunset it flies along the high sand hills slashed by the wind as if bitten by giant ants. It grows dark and soon masses of clouds pass. We follow an "oued" and wander with it among the sands. We descend to about 2000 feet altitude after

In the night the Dixmude sails over Aix-en-Provence and Avignon and then ascends to nearly 10000 feet, in order to pass over the central range of mountains. In the morning we are over

Paris, where we would have to remain till nine, to give the Parisians, who arise late, a chance to view the airship, but our commander has orders to reach Guers at 7 P.M. and we are obliged to depart. The wind now being favorable, we soon fly over the Loire, Gien, Cosne, Allier and Nevers. We then gain Treval, where the military airship "Republique" was destroyed in 1909. On this very day a monument is being dedicated to the victims of the disaster and the Dixmude takes part in the ceremony by dropping a message with a tricolored streamer attached. We then fly over Moulins, Roanne with its red roofs, Lyon and the Rhone. The view is magnificent. The mountains of Forez and Vivarais discharge the most picturesque tributaries into the river through deep ravines. On the left is the plain sown with villages and cut by lazy streams, then the Alpine barrier and, in the distance, Mount Blanc covered with snow.

We pass over Givors, Vienne, Valence, Montelimar, Orange, Carpentras and recognize the Drome, Roubion, Aygues and the Sorgue, dear to Petrarch. Here are Durance and Avignon, where we inspect the Chateau of the Popes. Here are Arles, Alpilles and Baux with its little church from which the golden fleece was carried away.

At sunset the Dixmude is above Berre. In the evening it passes Marseille and Toulon and reaches Cuers at 7:50 P.M. While waiting for daylight, it cruises from Hyeres to Menton and at 6 A.M., on September 30, after having been up for 118 hours and 50 minutes, and after making a voyage of more than 4400 miles, it

settles easily to the landing field and regains its hangar. The voyage is over. Let us proceed to a critical review.

The Dixmude was navigated with great regard for accuracy.

Astronomical observations were made frequently, interspersed with as accurate estimates as possible with the continual aid of the drift-meter. This method was successful at all times.

The weather was fine almost all the time and not bad at any time. The wind was feeble, though generally unfavorable. It was contrary 66 hours, propitious 25 hours and indifferent 24 hours. This explains its low average speed of 41.3 miles per hour. Moreover, the Dixmude had no fear of being surprised by bad weather. It was kept well informed by radio and made up the meteorological chart of Europe twice daily. On landing, the tanks still contained several tons of gasoline.

I will not say much about the Maybach engines, in order to avoid entering upon a long eulogy of them. Not one of them was stopped for more than two hours and the one in the rear car ran continuously from start to finish.

There is nothing to say about the maneuvering. We expected squalls above the sands of southern Algiers, which would interfere with the maneuvering of the airship. No disturbance was experienced, however, at an altitude of 4000 feet.

The living conditions on board were very comfortable. We slept on couches or hammocks. In the morning we made our toilet and drank a cup of hot coffee. The meals were excellent and included

at least one hot dish. For this purpose, the kitchens were installed over the exhaust pipes. Between the hours of service, we admired the landscape from comfortable seats in the passenger car. The only thing to fear is the cold, against which, in midwinter or at a high altitude, the aviation clothes do not afford sufficient protection.

Altogether, the long voyage was a beautiful pleasure trip and left with everybody only pleasant memories.

The Dixmude has proved its value and the efficiency of its crew, which, after only three trial trips, was able to make such a long voyage. As regards rigid airships in general, it demonstrated nothing new. Nevertheless, there are established facts which it is well to confirm from time to time, in order not to let them be forgotten.

It would take too long to expatiate on the advantages of rigid airships to the Navy in time of war, but, as regards air traffic in peace times, we will say that rigid airships, as now constructed, have nearly everything in their favor for assuming the role of large aerial packets. They have a radius of action of six to twelve thousand miles and a sufficient speed (a minimum commercial speed of 43 miles per hour) above that of all maritime packets and they can be made more comfortable than any other means of transportation.

Let us review the objections raised against them. First, lack of safety. Need we fear going astray as the result of poor navigating? No, because a rigid airship keeps its course, by means of

scientific operations, as accurately as a ship. Need we fear bad weather and tempests? A rigid airship avoids them, because it can move more rapidly than they. The wind? The greater the radius of action, the less there is to fear from this source. Engine breakdown? There are six engines on the average. If carefully inspected and repaired before each trip, there is small chance of their all breaking down at the same time. Even if they should, there still remains the static buoyancy and the possibility of maneuvering as a free balloon. This property, unconsciously sensed by all on board, gives to every passenger a feeling of safety which is lacking on an airplane.

There remains the terrible danger of fire. The gasoline may take fire somewhere and it may not be possible to extinguish it before it reaches the ballonets filled with an explosive gas, hydrogen, and then a catastrophe is inevitable. Every precaution is now taken against the gasoline, by means of ventilation, isolation of the engine cars and the distribution of fire extinguishers. Experiments are being tried with a view to replacing gasoline by heavy, inoffensive oils. This is a technical problem, which concerns airplanes as well as airships and balloons. Hydrogen would be very acceptable with an inoffensive fuel. Nevertheless, in order to be absolutely safe, the hydrogen must be replaced by some non-inflammable gas or mixture of gases. Helium, an inert gas, is now produced in the United States. The first American rigid airship, the ZR-1 ("Shemandoah") is inflated with helium.

Unfortunately, this gas is at present an American monopoly and is, moreover, very expensive. There is also objection to the high cost of the voyages. The cost is certainly high, but will it not be of advantage to go from Paris to Buenos Aires, to the Cape of Good Hope or to India in five days instead of seventeen? Is this advantage not worth paying for? All advance estimates are more or less arbitrary and it will be necessary, in order to judge of the possibilities of the financial success of aerial packets, to make an actual trial. Such a trial must be made at the expense of the government, for no private company would, unaided, assume the risk, even in countries where capital is bold.

This fact is understood by the Americans and they are going to make such a trial with the ZR-3, which they have bought from the Germans. The ZR-3 is a commercial airship and is expected to reach the United States, by way of the air, in the spring of 1924. The English will not be left behind and the "Burney Project," which calls for the exploitation, subsidized by the government, of the line to India by means of six airships of 3,532,000 cubic feet, will be put into execution during 1924-6. A German-Spanish project has been planned since 1921 for establishing a Seville-Buenos Aires line with six airships of 4,591,600 cubic feet gas capacity. In ten years perhaps the grand commercial routes of the world will be traversed by swift aerial packets, airships of 5 to 7 million cubic feet gas capacity, each carrying 100 passengers and several tons of baggage and mail.

Can France refrain from showing its flag also in the air?
Her financial condition will not allow her to take the lead with aerial packets "de luxe." Even if she abstains from the great international lines, can she, however, renounce rapid communication with her colonies? Shall English airships stop at Beyrouth, Madagascar and Saigon? Shall only Spanish airships stop at Dakar? This is not admissible.

Distanced just now by her powerful allies, France must make up for lost time, construct for herself the airship fleet she requires and assure communication with her colonies by means which are modest but in keeping with her power.

Translated by National Advisory Committee for Aeronautics.

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